

# **The GeoSAR Mapping System**

by

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The GeoSAR program is a cooperative effort to develop an airborne, radar-based, terrain mapping system for the mapping of foliage covered terrain is being developed at the Jet Propulsion Laboratory with funding provided by the Topographic Engineering Center. The main function of the GeoSAR interferometric radar-mapping instrument is the generation of digital elevation maps that in vegetated areas represent the bald earth elevation. This represents a major advance to current mapping technology that presently is unable to rapidly and accurately map sub-canopy elevations. To accomplish this goal we have designed and built a dual frequency interferometric mapping radar. One of the bands is an X-band interferometer (3 cm wavelength) which will achieve 1-2 m height accuracy but primarily maps the top of the vegetation canopy. In order to obtain bald earth elevation measurements a second interferometer operating at P-band (85 cm wavelength and 160 MHz bandwidth) is incorporated into the GeoSAR mapping system which exploits the fact that lower microwave frequencies penetrate deeper into the canopy. Although the elevation measurements made with the P-band interferometer will be closer to the bald earth elevations it does not measure the bald earth elevation directly due to the complex scattering of microwaves with the canopy and ground. In order to get true bald earth elevations it is necessary to use the interferometric correlation and semi-empirical models to correct the P-band elevation measurement to the bald earth elevation. This system was designed with the capability to notch specific frequencies when transmitting in order to avoid interfering with sensitive receivers operating in the same band. With the cooperation of the FAA we have conducted several tests to measure the amount of interference generated by the GeoSAR radar and showed the system was below the detection limit of the devices tested. This talk will present an overview of the GeoSAR system and some results of tests conducted to measure the amount interference generated by the GeoSAR system.

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